

299-E13-04 (A5852) Log Data Report

Borehole Information:

Borehole: 299-E13-04 (A5852)			Site: 216-B-17 Crib			
Coordinates (WA St Plane)		GWL¹ (ft):	347.75	GWL Date: 03/21/05		
North (m)	East (m)	Drill Date	Top of Casing Elevation (ft)	Total Depth (ft)	Type	
134393.884	573575.799	11/55	748.24	369	Cable	

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded Steel	1.5	6 5/8	6 1/8	1/4	1.5	100
Welded Steel	0	8	unknown	unknown	0	369

Borehole Notes:

The logging engineer measured the 6-in. casing and stickup using a steel tape. Measurements were rounded to the nearest 1/16 in. The 8-in. casing was not visible at the ground surface but is reported as being placed to 368 ft; casing information is derived from *Hanford Wells* (Chamness and Merz 1993). The 6-in. casing was placed to a packer set at 100 ft with a sand plug from 95 to 100 ft. The 8-in. casing was perforated and cement grout was placed in the annular space between the 6-in. and 8-in. casings from 0 to 95 ft. Groundwater level was measured by the logging engineer at 347.75 ft from the TOC. The depth to water was measured at 362 and 339.5 ft (reference depth unknown) in 1955 and 1992, respectively.

Logging Equipment Information:

Logging System:	Gamma 1E	Type:	SGLS (70%) SN: 34TP40587A
Calibration Date:	03/05	Calibration Reference:	DOE-EM/GJ864-2005
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4 Repeat	5
Date	03/18/05	03/21/05	03/22/05	03/22/05	03/22/05
Logging Engineer	Spatz	Spatz	Spatz	Spatz	Spatz
Start Depth (ft)	80.0	240.0	346.0	240.0	129.0
Finish Depth (ft)	2.0	128.0	241.0	204.0	120.0
Count Time (sec)	100	100	100	100	100
Live/Real	R	R	R	R	R
Shield (Y/N)	N	N	N	N	N
MSA Interval (ft)	1.0	1.0	1.0	1.0	1.0

Log Run	1	2	3	4 Repeat	5
ft/min	N/A ²	N/A	N/A	N/A	N/A
Pre-Verification	AE040CAB	AE041CAB	AE042CAB	AE042CAB	AE042CAB
Start File	AE040000	AE041000	AE042000	AE042106	AE042143
Finish File	AE040078	AE041112	AE042105	AE042142	AE042170
Post-Verification	AE040CAA	Not acquired	AE042CAA	AE042CAA	AE042CAA
Depth Return Error (in.)	0	- 1	N/A	N/A	- 2.5
Comments	No fine gain adjustment.	No fine gain adjustment.	No fine gain adjustment.	No fine gain adjustment.	No fine gain adjustment.

Log Run	6				
Date	03/23/05				
Logging Engineer	Spatz				
Start Depth (ft)	103.0				
Finish Depth (ft)	79.0				
Count Time (sec)	100				
Live/Real	R				
Shield (Y/N)	N				
MSA Interval (ft)	1.0				
ft/min	N/A				
Pre-Verification	AE043CAB				
Start File	AE043000				
Finish File	AE043024				
Post-Verification	AE043CAA				
Depth Return Error (in.)	0				
Comments	No fine gain adjustment.				

Logging Operation Notes:

Before logging the borehole was swabbed by a Health Physics Technician (HPT). No contamination was detected on the swab. Logging was conducted with a centralizer on the sonde for log runs 1 and 6. Logging data acquisition is referenced to the top of casing. No data were collected below groundwater. A repeat section was acquired in this borehole to evaluate system performance.

During log run 2 the logging vehicle was shut down because of a fuel leak on the motor. Consequently, a post verification measurement was not acquired at the end of the day.

Analysis Notes:

Analyst:	Henwood	Date:	04/14/05	Reference:	GJO-HGLP 1.6.3, Rev. 0
-----------------	---------	--------------	----------	-------------------	------------------------

Pre-run and post-run verifications for the logging system were performed before and after each day's data acquisition. The log data are accepted.

A combined casing correction for 0.572-in.-thick casing was applied to the log data between 0 and 100 ft. Below 100 ft a correction for 0.322-in.-thick casing was applied.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with an EXCEL worksheet template identified as G1EMar05.xls using efficiency functions and corrections for casing, water, and dead time as determined from annual calibrations. Dead time corrections are applied to the data when dead time exceeds 11.4 percent. No corrections for water were necessary.

Log Plot Notes:

Separate log plots are provided for the man-made radionuclides (^{137}Cs and ^{60}Co) detected in the borehole, naturally occurring radionuclides (^{40}K , ^{238}U , ^{232}Th [KUT]), a combination of man-made, KUT, and dead time, and total gamma plotted with dead time. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, casing corrections, or water corrections. Historical gross gamma logs acquired in 1956, 1958, 1959, 1963, 1968, and 1976 derived from Additon et al. (1978) are included for comparison with the current log data. A repeat log section is also included.

Results and Interpretations:

^{137}Cs and ^{60}Co were the man-made radionuclides detected in this borehole. ^{137}Cs was detected between 15 and 70 ft and between 323 and total depth (346 ft); the maximum concentration was measured at approximately 850 pCi/g at 19 ft. The ^{137}Cs detected near the bottom of the borehole is probably related to residual contamination on the casing remaining after contaminated groundwater has receded. ^{137}Cs was also detected at few other sporadic locations throughout the borehole near the MDL of approximately 0.2 pCi/g.

^{60}Co was detected between 22 and 80 ft. The maximum concentration was measured at approximately 0.4 pCi/g at 74 ft.

Historical gross gamma logs of this borehole showed elevated gamma activity where the detector was saturated, from approximately ground surface to 135 ft from 1955 to 1963. By 1968, much of the activity had apparently decayed away and the highest activity zone existed from the ground surface to approximately 90 ft, reflecting the current gamma profile. The only remaining gamma-emitting radionuclides measured during 2005 in this depth interval are ^{137}Cs and ^{60}Co .

The repeat section generally indicates good agreement of the naturally occurring KUT. Radon was observed in the borehole in log runs 1, 4, and 5.

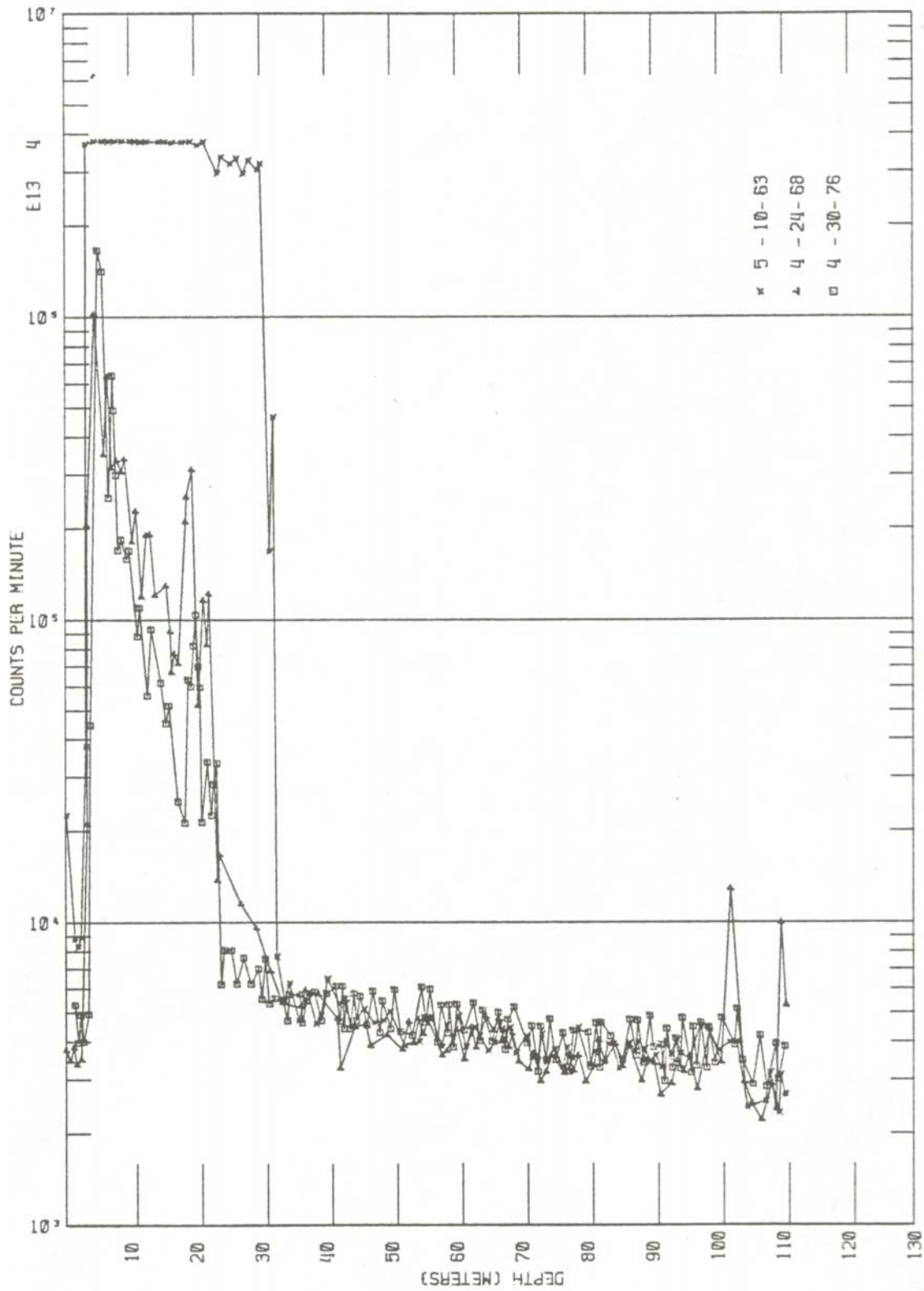
References:

Additon, M.K., K.R. Fecht, T.L. Jones, and G.V. Last, 1978. *Scintillation Probe Profiles From 200 East Area Crib Monitoring Wells*, RHO-LD-28, Rockwell Hanford Operations, Richland, Washington.

Chamness, M.A., and J.K. Merz, 1993. *Hanford Wells*, PNL-8800, Pacific Northwest Laboratory, Richland, Washington.

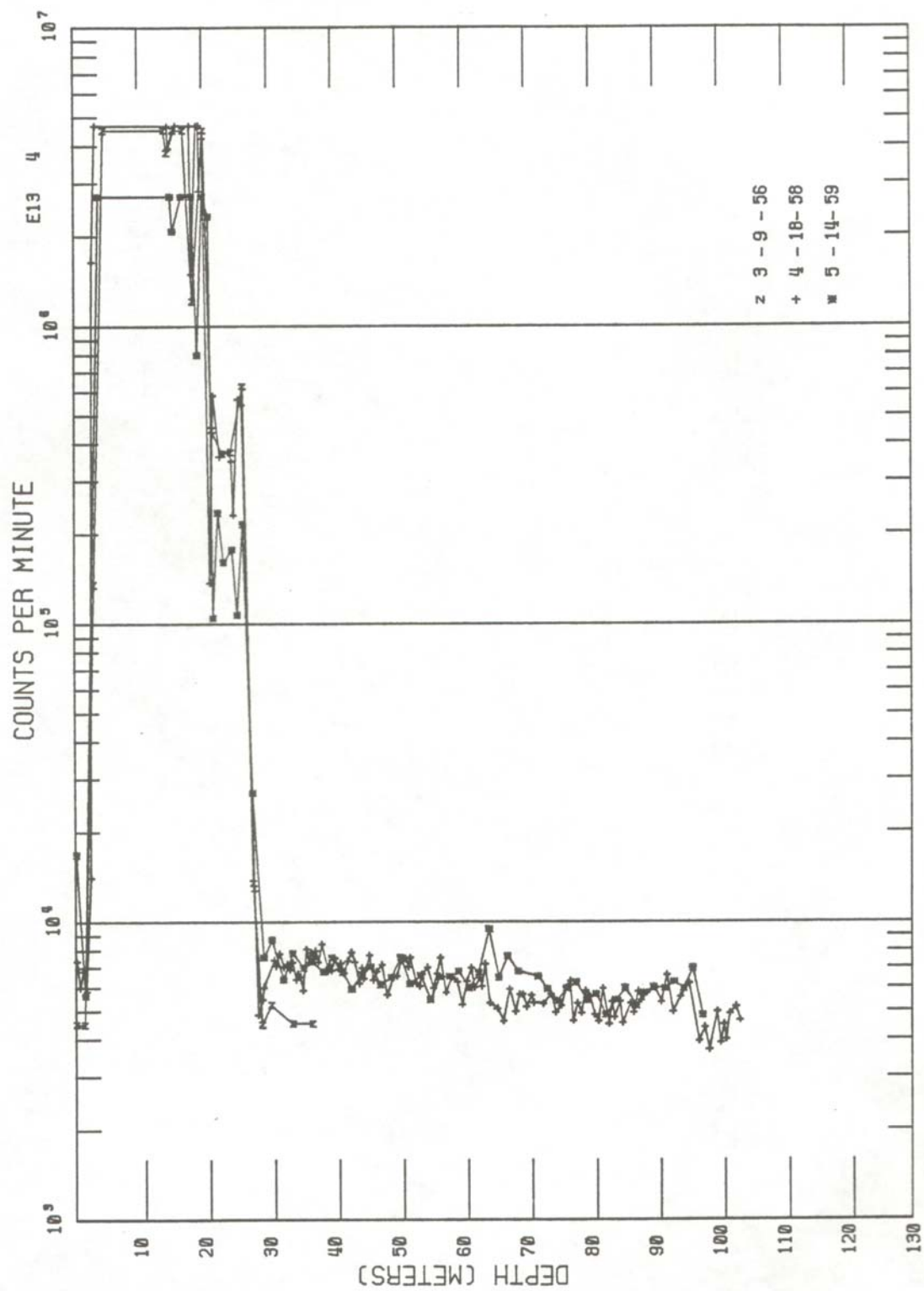
¹ GWL – groundwater level

² N/A – not applicable



from Additon et al. (1978)

Historical Gross Gamma Logs for Borehole 299-E13-04, Logged on 5/10/63, 4/24/68, and 4/30/76

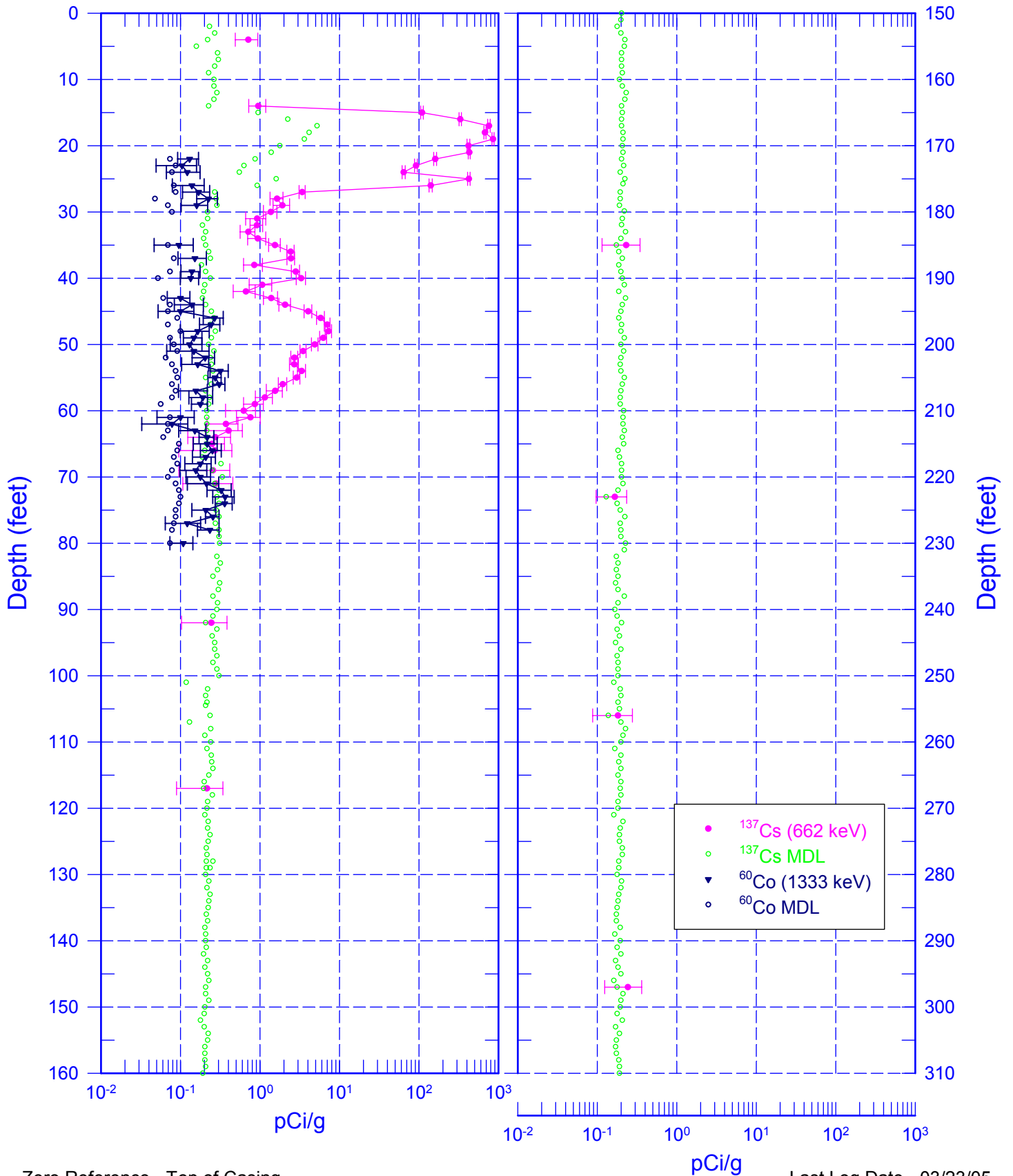


from Additon et al. (1978)

Historical Gross Gamma Logs for Borehole 299-E13-04, Logged on 3/9/56, 4/18/58, and 5/14/59

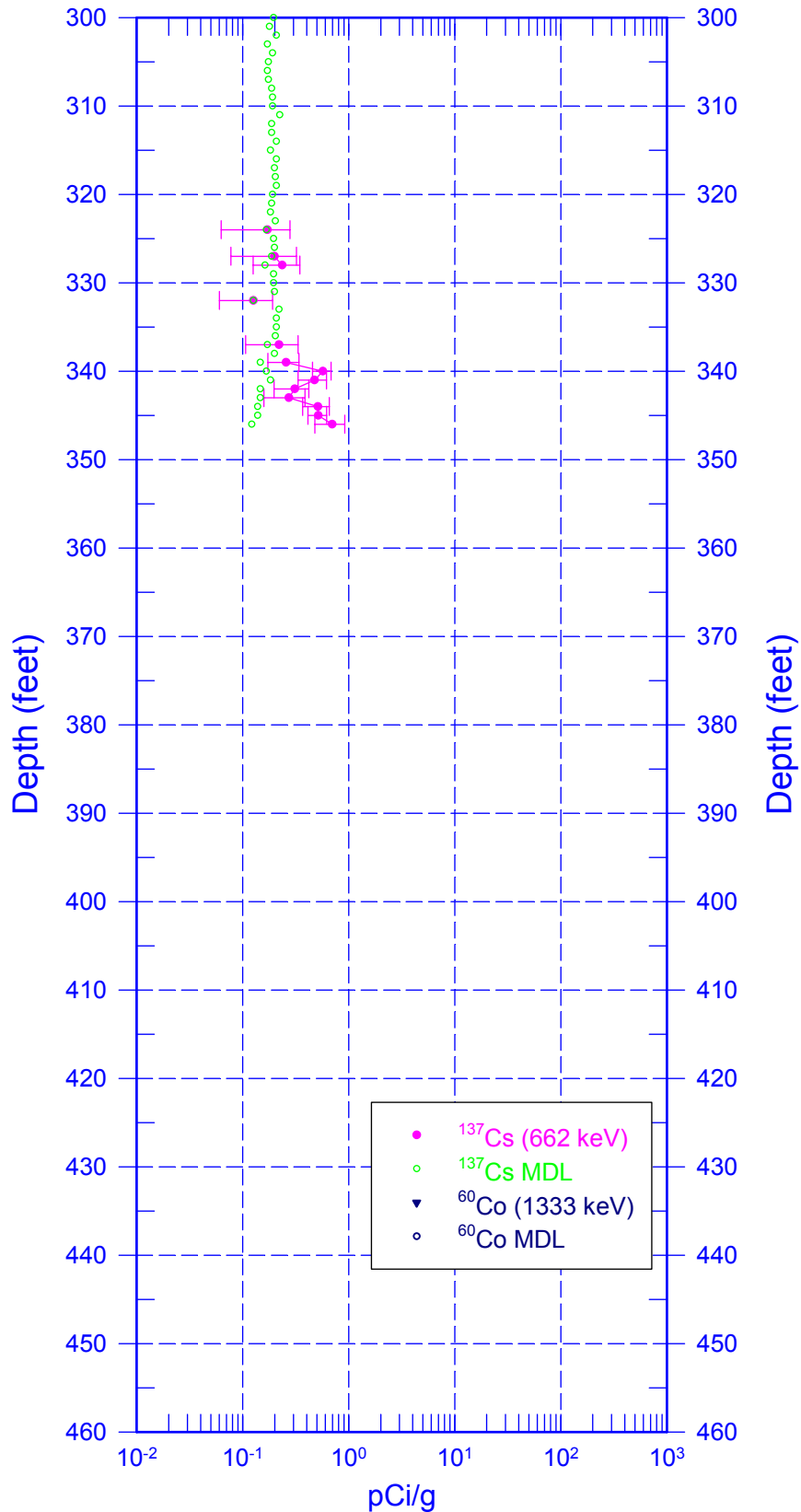
299-E13-04 (A5852)

Man-Made Radionuclides



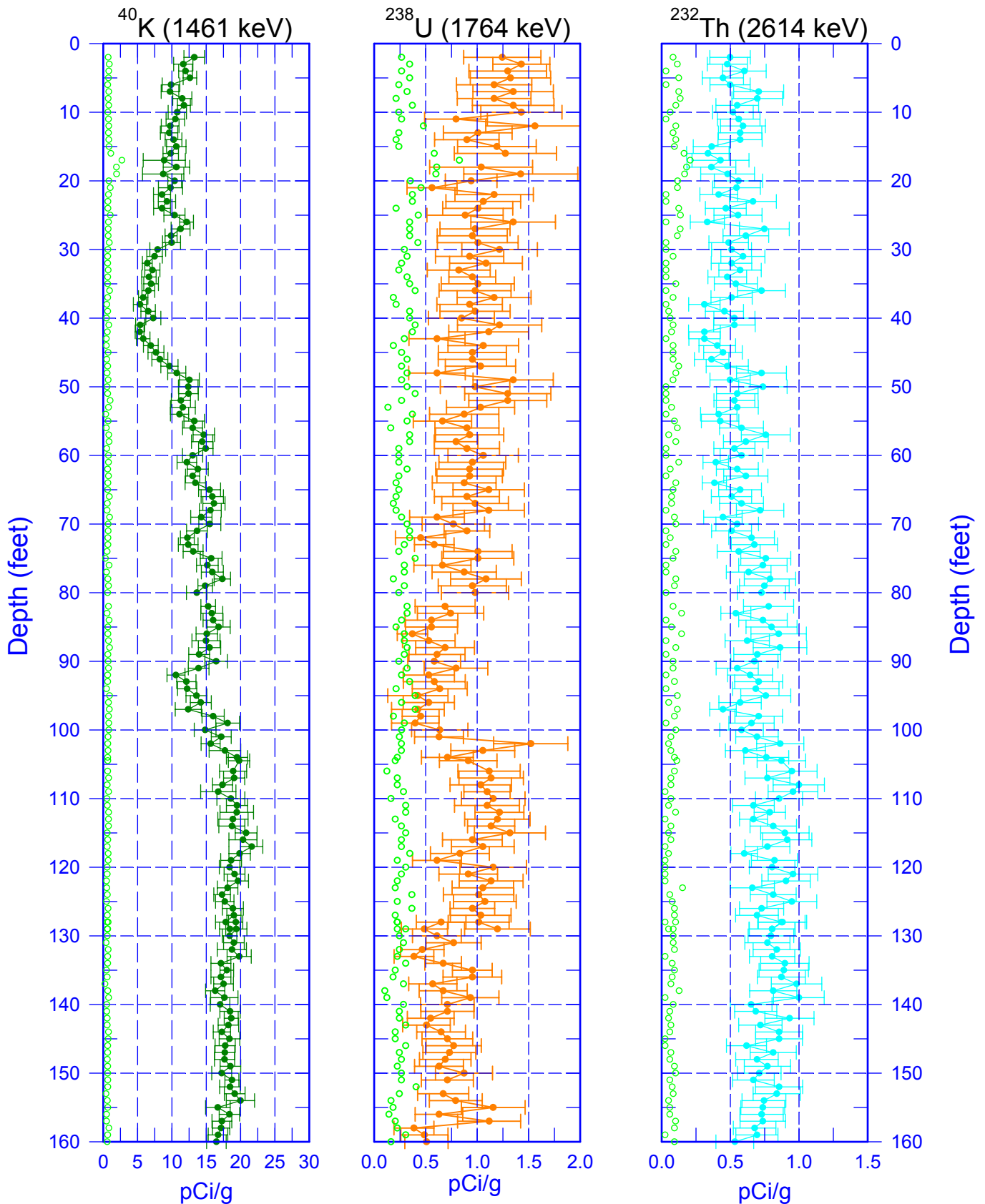
299-E13-04 (A5852)

Man-Made Radionuclides



299-E13-04 (A5852)

Natural Gamma Logs

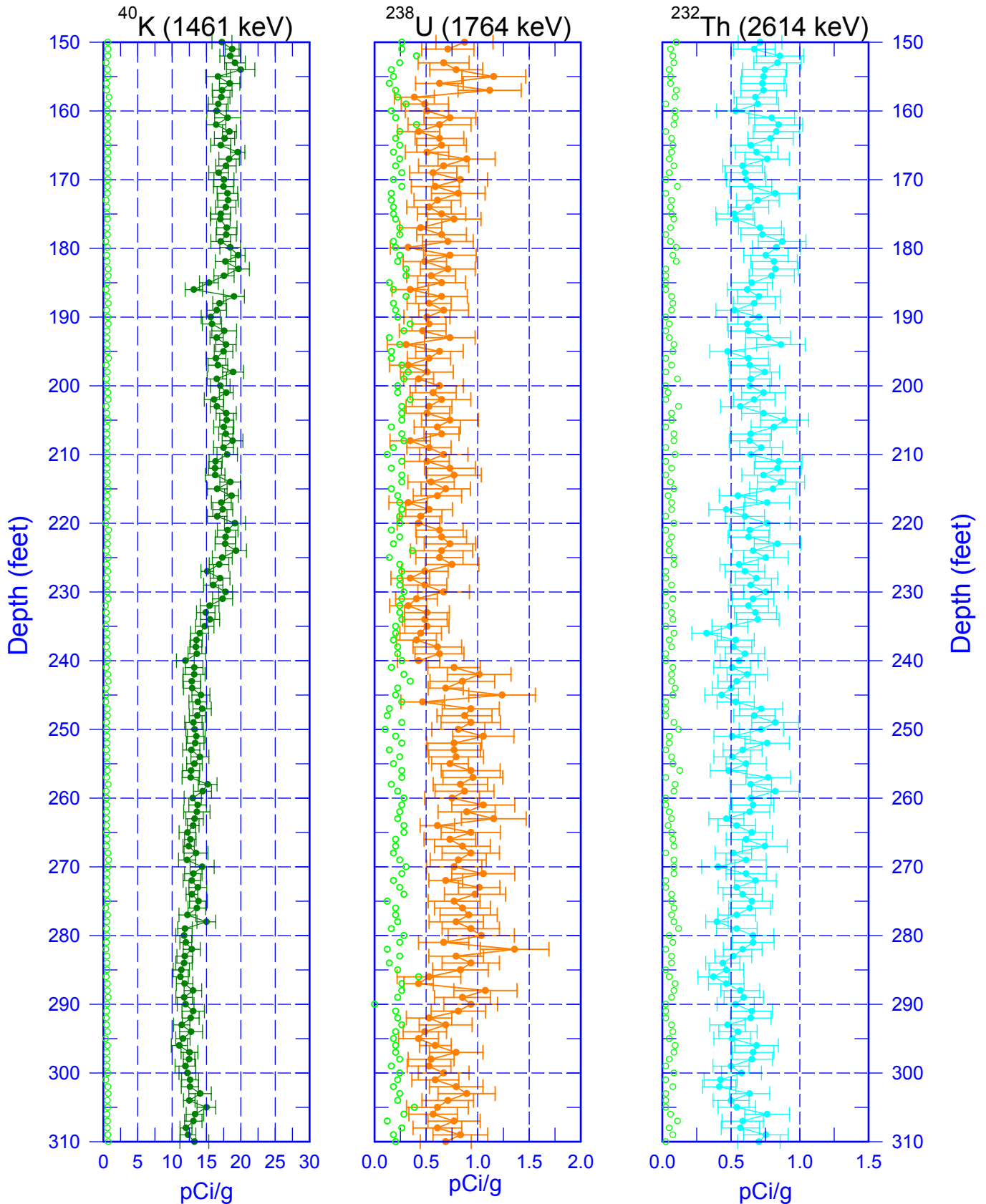


Zero Reference = Top of Casing

Last Log Date - 03/23/05

299-E13-04 (A5852)

Natural Gamma Logs



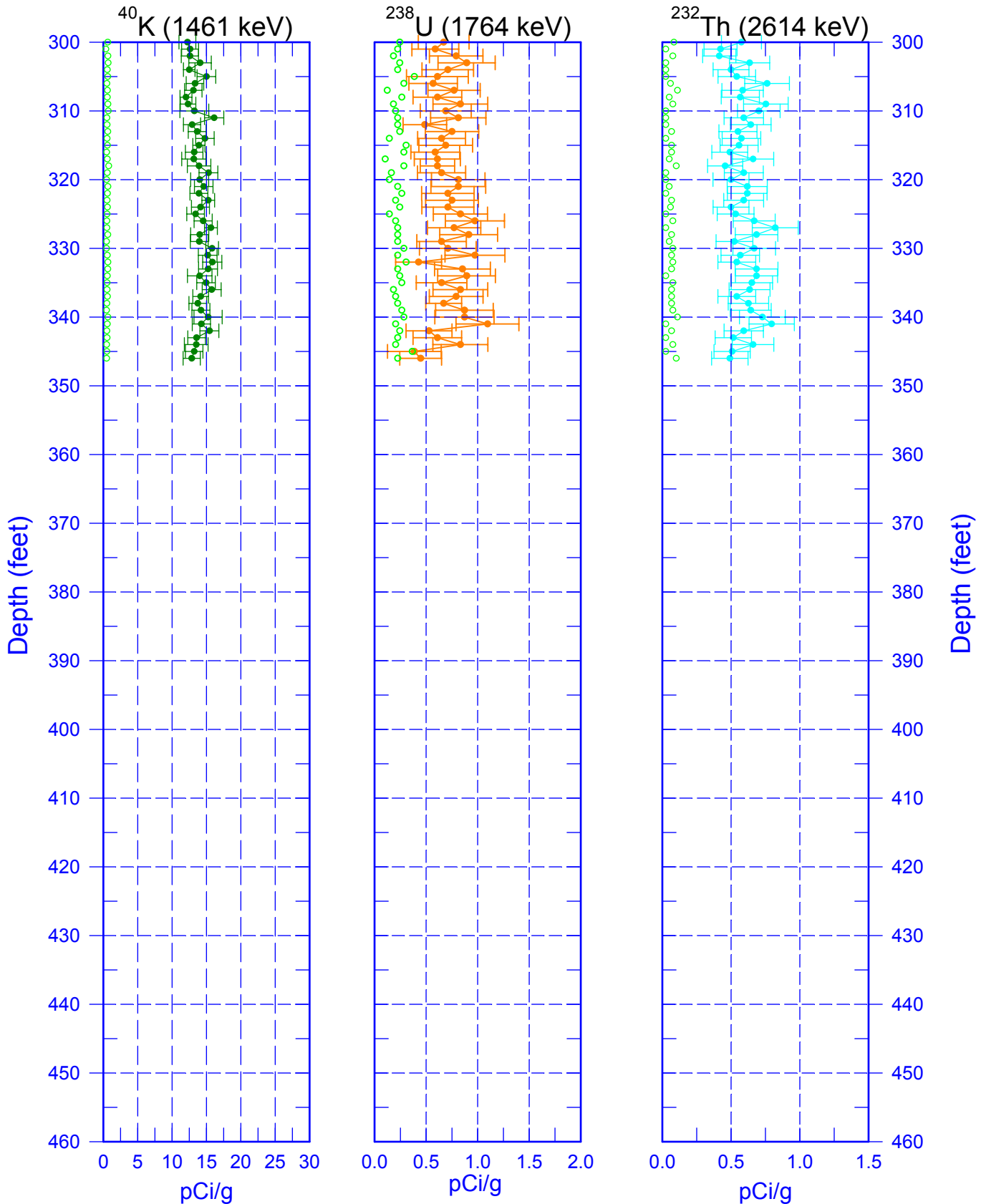
Zero Reference = Top of Casing

○ MDL

Last Log Date - 03/23/05

299-E13-04 (A5852)

Natural Gamma Logs

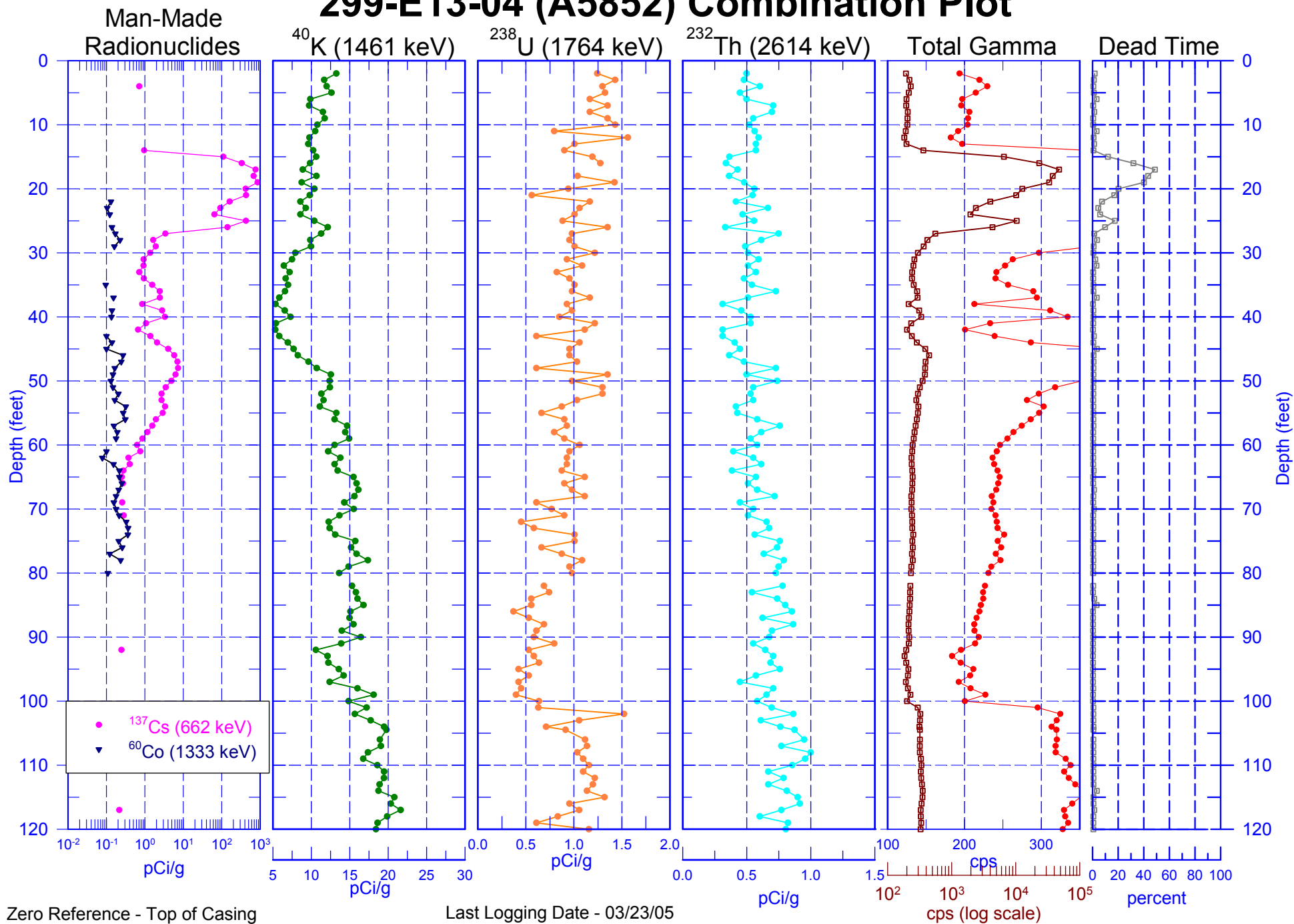


Zero Reference = Top of Casing

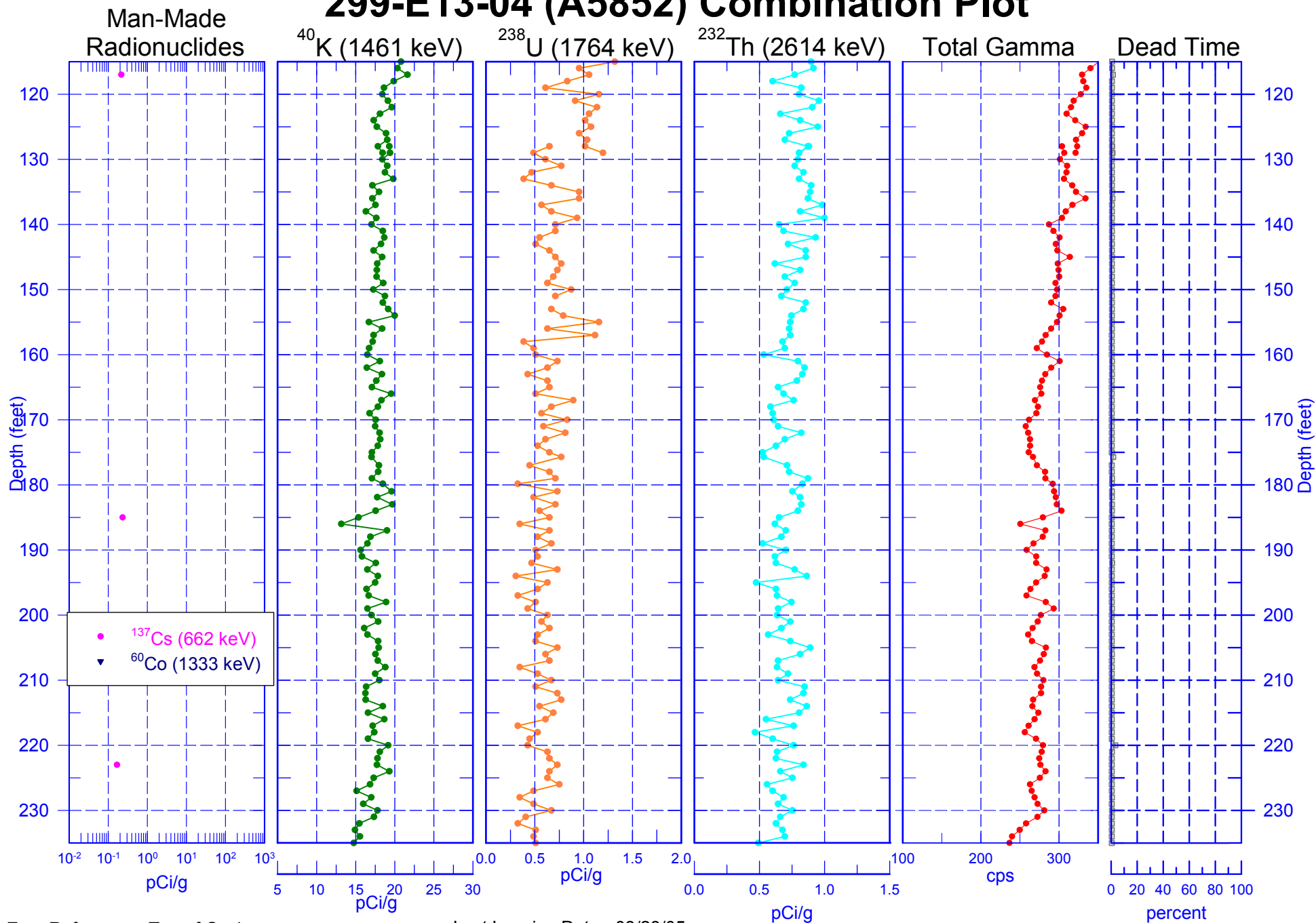
○ MDL

Last Log Date - 03/23/05

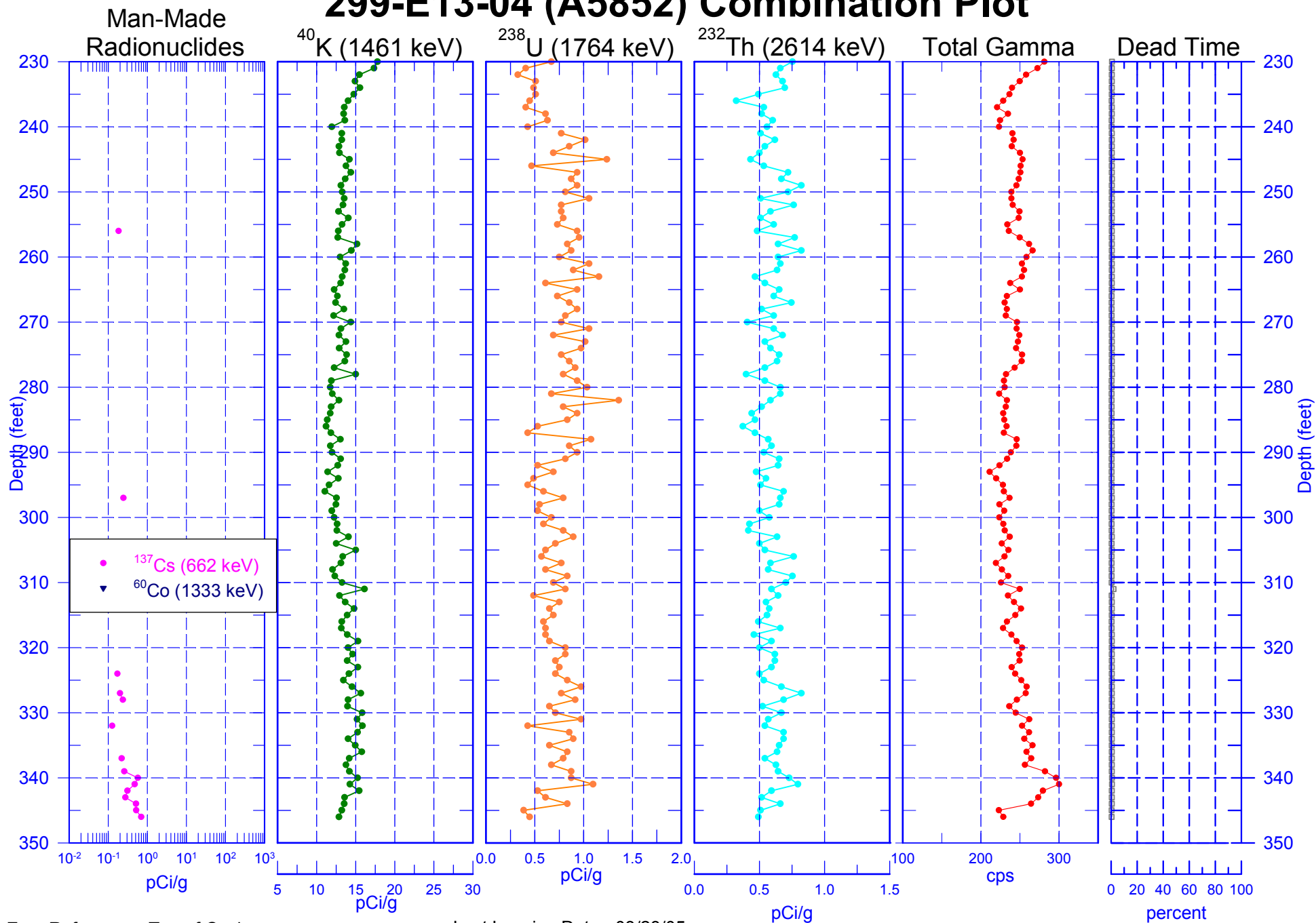
299-E13-04 (A5852) Combination Plot



299-E13-04 (A5852) Combination Plot

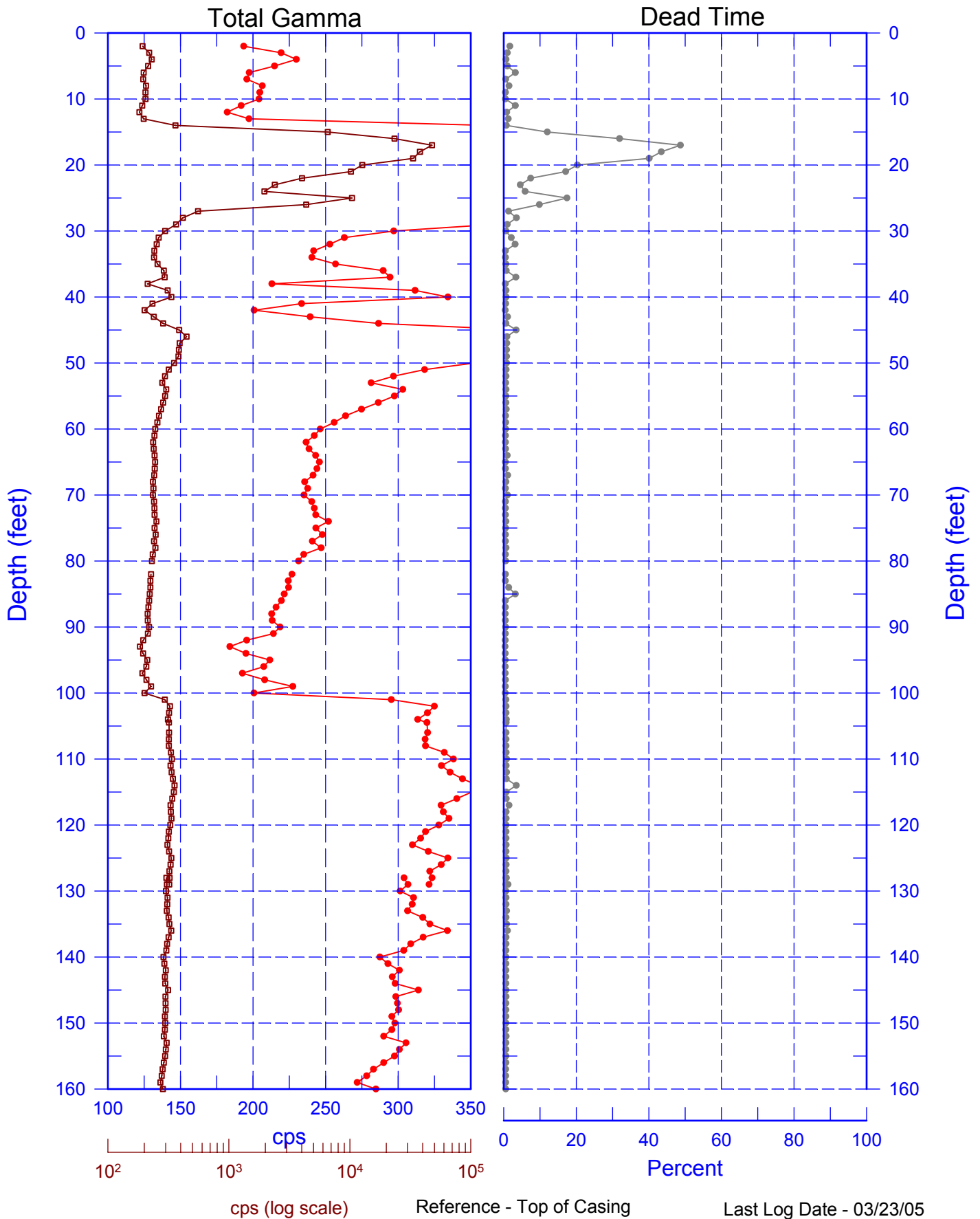


299-E13-04 (A5852) Combination Plot



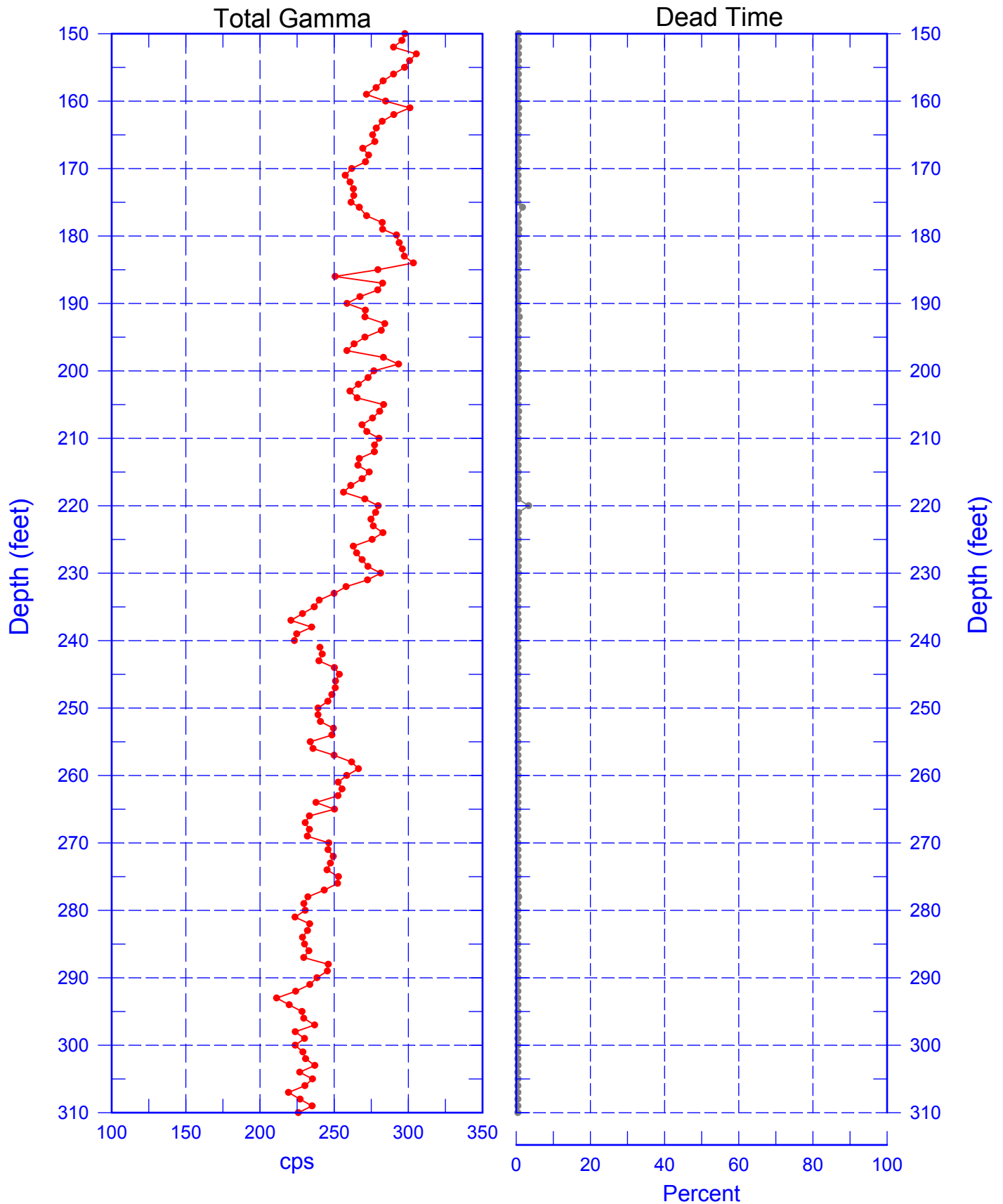
299-E13-04 (A5852)

Total Gamma & Dead Time



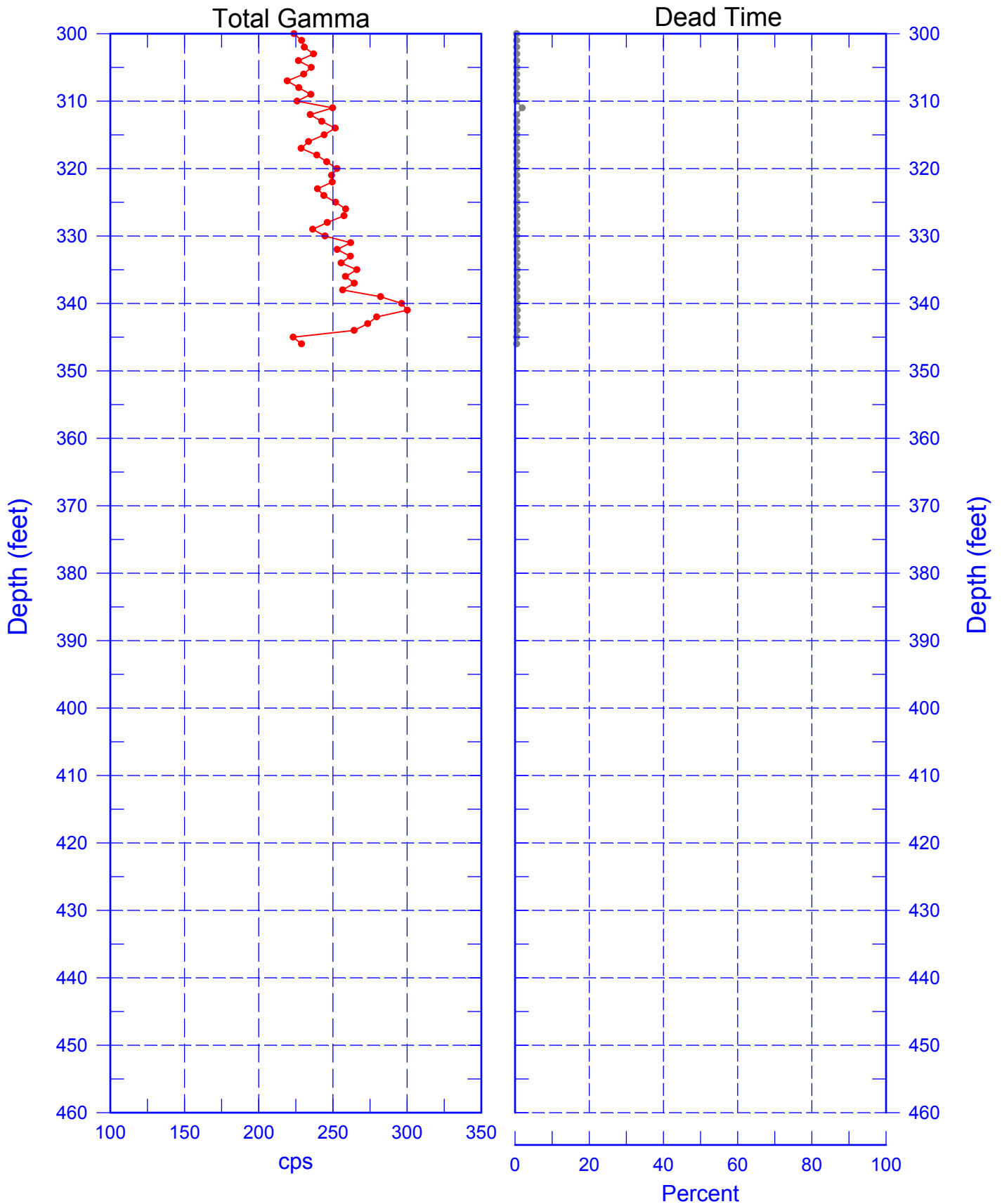
299-E13-04 (A5852)

Total Gamma & Dead Time



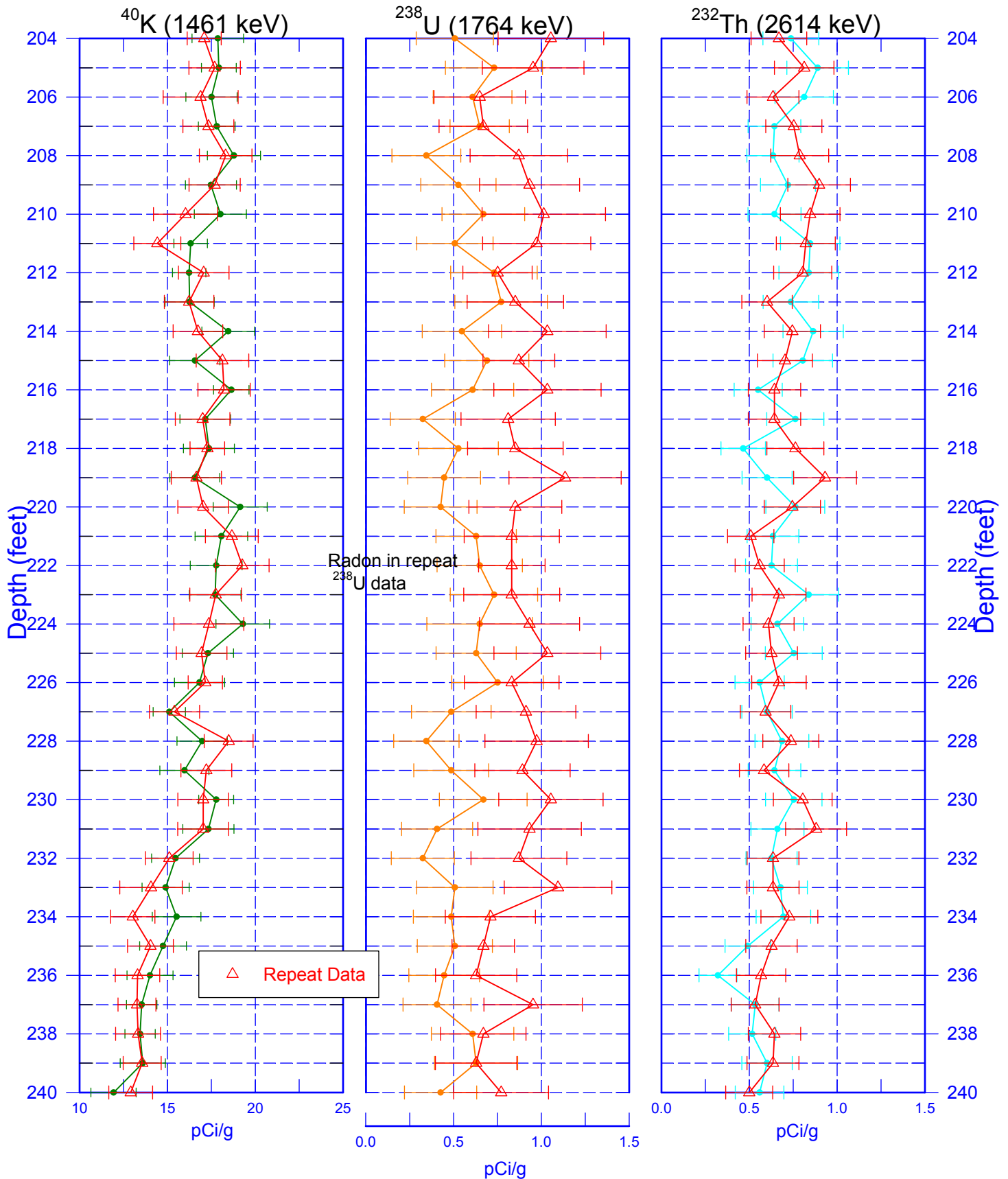
299-E13-04 (A5852)

Total Gamma & Dead Time



299-E13-04 (A5852)

Repeat Section of Natural Gamma Logs



Zero Reference - Top of Casing

Last Log Date - 03/23/05